

INTEGRATING CATCHMENT WITH COASTAL MANAGEMENT: A SURVEY OF INTERNATIONAL AND NEW ZEALAND BEST PRACTICE

*Peter Gustafson, Parsons Brinckerhoff;
Clare Feeney, Environment and Business Group;
Claudia Hellberg and Matthew D. Davis, Auckland Regional Council.*

ABSTRACT

A study to identify best international and local practice for integrated coastal and catchment planning and management (ICCM) was undertaken for the Auckland Regional Council (ARC). Internationally, several best practice elements are identifiable, including political leadership; cross sector collaboration; stakeholder engagement; improved capacity building; provision of adequate resourcing for both planning and implementation phases; good governance and clear institutional frameworks; monitoring and evaluation of outcomes that leads to adaptive management; and the presence of a strong catchment manager or champion. Key learnings from the project include the various scales at which ICCM works; legislative and organisational frameworks and the incorporation of regional planning issues and rural and urban land uses into catchment planning; integration of biophysical, economic, social and cultural issues and progressive phasing in of related issues; applicability to both greenfield and brownfield developments and a range of collaborative models, including 'bottom-up' (community and/or iwi-led), 'top-down' (regulatory or 'expert' led) and partnership approaches. The project also framed an aspirational goal of building industry capacity and collegiality and community capacity for ICCM.

KEY WORDS

Integrated catchment management planning, coastal planning and management, best practice, capacity-building

PRESENTER PROFILE

Peter Gustafson is a Senior Natural Resources consultant with over eleven years experience in water and catchment management in Australia. Peter has been involved in developing statutory river and catchment management plans since 2000 and has a strong focus on genuine community engagement to achieve pragmatic on-ground management outcomes.

Clare Feeney is a Director of Environmental Communications Ltd, a member of the Environment and Business Group (EBG), and has over twenty years experience in environmental management. She has expertise in a broad range of technical areas relating to water and soil management, integrated catchment management planning, sustainable all-waters management, riparian restoration in urban and rural settings, network discharge consents, integrated outcome monitoring across all four wellbeings (environmental, social, cultural and financial), pollution prevention and cleaner production/resource efficiency. Clare does environmental training for sectors including earthworks, manufacturing and construction.

1 INTRODUCTION AND APPROACH

Catchment and coastal management are rapidly developing fields in which reactive and visionary responses constantly overtake each other, often heavily influenced by government policy and investment strategies. However, they have traditionally been carried out in isolation from each other. A project to examine international, national and regional experience with integrating the two and to identify elements of best practice.

Integrated catchment management is a globally established concept (Bowden, 1999), with many models operating in numerous countries around the world for over 100 years. More recently there has been a growing appreciation of the need to more fully integrate the planning and management of catchments with that of their coastal management receiving environments. Given the global variation in geography, social, political, institutional, legal, biophysical and ecological variables, there is remarkable parity of experience in terms of successes and shortcomings in the development and implementation of integrated catchment and/or coastal management plans.

The literature review showed that views of integrated catchment and coastal management (ICCM) are changing over time. A growing understanding of the benefits of stakeholder engagement in management has paralleled a shift towards a multiple bottom line approach that better reflects real world trade-offs in environmental management. In New Zealand for example, a progressively widening focus from flooding to ecosystem health is a significant shift, along with a growing appreciation of urban ecology and its potential for native biodiversity. Even the view that a catchment focus is the only constant has shifted as catchment managers realise they are also managing land uses for the purposes of ecosystem health in the ultimate saline receiving environments.

In New Zealand, as echoed from overseas experiences, there has been a view that integrated catchment management is a predominantly rural process, despite its comparatively long urban history in Auckland. This view is also shifting, with a growing realisation that the integrated management process has much to offer both rural and urban catchments, as well as those with mixed uses on the peri-urban margins of our urban areas.

The methodology was to identify a set of core elements of best practice from 17 representative local and international studies and use these to assess and inform the Auckland experience.

2 DEFINING CATCHMENT MANAGEMENT AND INTEGRATED CATCHMENT MANAGEMENT

The terms catchment management and integrated catchment management have been distinguished from each other in New Zealand, where catchment management traditionally focused on soil conservation and flood control. In the Auckland region, the term is used to refer to the systematic management of water quantity issues in urban catchments by the use of catchment management plans (CMPs).

Integrated catchment management is a more holistic approach to manage natural resources such as land, water, soil and vegetation within a defined geographic catchment area. It ensures that individual resource management issues such as flooding, soil conservation, land stability, water quality, soil quality, erosion and sediment

control, water extraction, wastewater, waste, stormwater and other discharges and aquatic and terrestrial biodiversity and ecology are not considered in isolation, but in an integrated plan of management that also considers the environmental, social and economic impacts of activities in the catchment. It generally seeks to engage the community, business and local and regional government in a partnership that incorporates sustainable management actions across all sectors of the community.

Over most of New Zealand and as much of the international literature confirms, integrated catchment management still retains a rural focus, although in the Auckland region (and more recently in some other regions also subject to rapid urban growth), it has an urban focus. In the Auckland region, the term integrated catchment management plan (ICMP) is used in two ways. Firstly it is used in a narrow sense to refer to plans that address matters of stormwater quantity and quality to distinguish them from the older water quantity only CMPs. Secondly, it is used in a wider sense to refer to plans that encompass some of the wider issues listed above as well as water quality and quantity.

Unlike some overseas models (such as Water Management Plans in New South Wales, Australia), Auckland's ICMPs are non-statutory statements of intent: they have no statutory standing of their own, and achieve their objectives by influencing other statutory instruments that control or respond to development, environmental, social and cultural needs (e.g., stormwater network discharge consents and district and structure plan land use changes).

While integrated catchment management in some overseas jurisdictions has a wider mandate, this paper use the following definitions terms with reference to the Auckland region:

- catchment management plan (CMP): a plan for managing water quantity in urban catchments;
- integrated catchment management plan (ICMP): a plan for managing water quantity and water quality, with a focus on the urban areas of catchments and the matters identified in the *Proposed Auckland Regional Plan: Air, Land and Water* (PARP:ALW) (ARC, 2007); and
- integrated catchment and coastal management (ICCM): a process (which may or may not be encompassed in a single plan) that considers the effects of land uses, surface and underground water resources, their associated terrestrial and aquatic biodiversity, built water-related infrastructure and other activities or services in the many catchments that surround or adjoin a defined saline receiving environment.

For simplicity within the paper, the term ICCM is used when referring generally to catchment and coastal planning and implementation processes. The exception is if a specific subset of ICCM is discussed (e.g., only the catchment, water or natural resources, or if the specific Auckland region ICMP process is the subject).

Worldwide, views on and drivers for more ecologically sustainable development have refocused attention on the opportunities offered by a stronger focus on ICCM. For successful integration of catchment with coastal management, the following integrations are needed (the following summary has been adapted from Brookes' (no date) modification of Vallega's (2000) elements of successful integrated coastal zone management, together with additions from Hellberg (2007) and Chrystall (2006)):

- inter- and trans-disciplinary: integrating a wide range of expertise across the biophysical, social and engineering sciences, including planning and economics and other disciplines is essential in order to provide for the other integrations;
- spatial: holistic management of all the land catchment areas from the ridge top to the coast, coastal land, brackish and estuarine areas and other coastal waters and the marine area, addressing all land and water uses with management areas defined on the basis of holistic and meaningful geographic and ecosystem boundaries;
- temporal: the current tendency towards short term actions and strategies need to be framed into longer term prospects and programmes such as the 100 years envisaged by the Auckland Sustainability Framework (Regional Growth Forum, 2007);
- natural and built services (green and grey): integrating built water and other services into the natural environment by using and mimicking natural biophysical tools and principles;
- legal and jurisdictional: the legal and administrative frameworks need to provide appropriate regulations to support integrated management;
- regulatory: the actions of all decision makers should be vertically and horizontally coordinated and reflect the aspirations of local communities for good outcomes across all wellbeings (defined next);
- management: outcomes, objectives, methods and monitoring need to reflect the four wellbeings (social, economic, environmental, and cultural) and sustainable development promoted under the Local Government Act (LGA) as well as the more bio-physically-focused sustainable management outcomes promoted by section 5 of the Resource Management Act (RMA). These are comparable with the triple or quadruple bottom lines referred to in overseas literature; and
- social and cultural: “top down” and “bottom up” processes need to be harmonised to optimise the participation of stakeholders, local communities and iwi in identifying issues, outcomes and methods for integrated catchment and coastal management.

Reflecting these trends, this paper arises from ongoing development of the integrated catchment management concept in the Auckland region, in particular the growing awareness of the need to more closely integrate catchment management with the management of coastal waters.

3 INTERNATIONAL EXPERIENCES IN ICCM

A large volume of international literature documents the evolution of ICCM across various geographic, political, environmental, social and economic scales. In reviewing this literature, the authors sought to identify ICCM successes and failures and how these have driven the development of best practice integrated coastal and catchment management and planning. Best practice elements of ICCM are described in detail in the following sections.

3.1 Developing best practice ICCM

ICCM goes by many names internationally, including Total Catchment Management (Australia); Integrated Catchment Management (New Zealand); Integrated Watershed Management (USA); Integrated River Basin Management (UK); and Integrated Water Resource Management (UK) but they all share the same elements – “engaging stakeholders through a partnership approach, coordinating action across jurisdictions,

systems thinking, and using a balanced approach to weigh concerns for sustainability against development” (Menzies and Hooper, 2008).

Interestingly, while ICCM and related planning and management processes have been utilised internationally in various forms for over 100 years, and are generally supported as being the most beneficial and appropriate model for catchment or coastal planning and management, examples of successful long term ICCM programmes remain infrequent (Davis, 2007). Moreover, despite this history and general consensus as to its benefits, integrated catchment management is still an elusive process, with many jurisdictions not utilising the concept (especially in developing nations) or only partly implementing the plan’s management actions (Davis, 2007).

The concept of ICCM and its application to diverse water and natural resource management issues has however come to the fore in recent years as a way of ensuring the equitable, economically sound and environmentally sustainable management of natural resources including water (Global Water Partnership, 2003).

Several key themes recur amongst the reviewed literature on successes and shortcomings in catchment management processes, suggesting, either obliquely or explicitly, a number of critical factors that should be considered in developing a “best practice” ICCM process:

- political leadership to ensure ICCM is integrated across institutional boundaries and within realistic timeframes;
- appropriate legislative, institutional and governance frameworks;
- adequate resourcing (including long term funding streams or income generation opportunities), both to develop and implement the ICCM and ICMP over time;
- collaboration between and within the public and private sectors;
- genuine community participation – ideally a bottom-up approach, although mixed models are also successful;
- an ICCM champion;
- capacity building between and within the public and private sectors inclusive of succession planning;
- from the start of the process, clearly articulated goals and objectives, roles and responsibilities of public and private sector partners;
- specific, measurable and time bound targets for determining change resulting from the ICCM – where possible these should be both quantitative and qualitative;
- monitoring and evaluation of ICCM outcomes; and
- adaptive management that is driven by monitoring and evaluation outcomes.

A more comprehensive summary of the literature and its relevance to the Auckland Region is in Table 1.

Table 1: Summary of international best practice ICCM.

ICCM element	Best Practice Approach	Alternative Accepted Practice	Relevant to Auckland Region	Comment
Scale	Macro	Meso	Yes	Macro scale ICCM allows for full integration of natural resource issues including coverage of surface water, groundwater and coastal environments.
Legislation	1. ICCM planning 2. Management Authority enabling	Supporting natural resource management	Yes	While ICCM specific legislation may not be critical, enabling legislation for ICM related issues is generally necessary The Resource Management Act enables ICCM processes.
Institutional framework	Identified ICCM authority	Cross sector/ jurisdictional agreements	Yes	Auckland Regional Council generally fills the role of the lead ICCM authority.
Governance framework	1. International policy framework 2. National policy framework	Clear public and private sector roles	Yes	Development of a national or regional ICCM policy approach is beneficial to achieving on-ground resource improvement and minimises conflicting programme development.
Financial / investment structure	1. Combined public and private sector investment sources 2. Performance driven investment strategies	User pays/ market based instruments	Yes	Any investment strategy or funding source must consider both short and long term income generation that reflects both the resource planning and environmental improvement timeframes.
Collaborative approach	Bottom-up	Mixed model	Yes	Shared Vision Planning and other participatory methods should be investigated to engage all stakeholders (both public and private sector); this will ensure the relevant stakeholders have 'ownership' buy-in during the planning and implementation phases of ICCM. Collaboration must occur both within and between sectors.
Capacity building	Capacity building framework	Knowledge building, training and communication strategies	Yes	Targeted capacity building initiatives including education, training, communication and research. Succession planning for all participants is critical to achieving the ICCM continuum.
Biophysical variables	Dependent on scale and local variables but should include consideration of: <ul style="list-style-type: none"> • river flow (hydrology) • water quality • soil condition/ health/ erosion • surface & groundwater connectivity • freshwater and saline connectivity • rainfall and runoff • vegetation, especially endemic vegetation • land use including greenfield and brownfield • threatened species and communities 		Yes	The list of variables for consideration under ICCM is extensive and must be carefully considered so as to target those which can be realistically benefited under the resourcing and implementation timeframes for the ICMP. Better integration of climate change considerations is likely to be an emerging issue for future ICCM programmes

ICCM element	Best Practice Approach	Alternative Accepted Practice	Relevant to Auckland Region	Comment
	<ul style="list-style-type: none"> dependent ecosystems climate change 			
Socio - economic variables	Dependent on scale and local variables but should include consideration of: <ul style="list-style-type: none"> behavioural change recreational values property rights market failures intergenerational equity third party impacts price (market) incentives resource asset trading private sector implementation cost cultural and heritage values 		Yes	The list of variables for consideration under ICCM is extensive and must be carefully considered so as to target those which can be realistically benefited under the resourcing and implementation timeframes for the ICMP.
Indigenous values	Cultural Framework Index	<ol style="list-style-type: none"> Targeted engagement Indigenous specific goals and objectives 	Yes	The incorporation of Māori interests is critical in the New Zealand context. The existing CFI is an outstanding tool to assist in the incorporation of Māori interests in ICCM programmes.
Sustainability	Inclusion of Ecologically Sustainable Development principles		Yes	ESD principles should be incorporated in all ICCM programmes.
Implementation	<ol style="list-style-type: none"> An ICCM champion An ICCM business plan using S.M.A.R.T.E.R principles 		Yes	Most experiences of successful ICCM have been achieved through the dedication of ICCM champions in conjunction with a specific business plan that incorporates Specific, Measurable, Affordable, Realistic, Time bound, Endorsed and Relevant goals, objectives and targets.
Monitoring and evaluation for adaptive management	Monitoring, evaluation and reporting framework	Identified review periods	Yes	Monitoring and evaluation frameworks result in targeted, regular assessment of ICCM outcomes that consider changes in resource condition and emerging issues or new science to achieve a flexible, adaptive management approach.

3.1.1 PLANNING SCALE

The geographic or spatial scale of an ICCM process is critical to defining the issues which should be addressed, the public and private sector participants that should be involved and the goals, objectives and timeframes for developing, implementing and adapting an integrated catchment/coastal management plan (ICCMP).

A definition of planning scales is described by Hooper (2006) for Integrated Water Resource Management (IWRM). The focus of IWRM is coordinated decision-making about NRM and is cross-sectoral, participatory and adaptive. This approach is also strategic, focusing on what needs to be done first, rather than on all-embracing efforts (Hooper, 2006). Hooper's definitions (refer to Table 2) apply equally to ICCM and have been adopted in this paper; bracketed Table 2 text are suggested adaptations for the ICCM process in New Zealand given the differences in geographic scale and political/jurisdictional boundaries compared with those in Hooper's analysis.

Table 2: ICCM planning scale, adapted from Hooper (2006) to reflect ICCM planning processes.

Natural System and Resources	Macro Level Part of a geographical zone such as a river basin or ecological zone	Meso Level Regional or local ecological resource system	Micro Level Areas with relatively uniform ecological conditions
Mapping scale	>1:1,000,000 [> 1:500,000]	1:100,000 - 1:500,000	1:10,000 – 1:1,000
Mapping unit	Provinces [Connected river, aquifer, estuarine and coastal systems (“harbour catchments”)]	Land systems [River and coastal catchments. Aquifers]	Land units, land facets [Sub catchments; specific estuary, wetland or ecological assets]
Level of decision making	National Level [National or Cross-regional]	Regional Level	Local Level and Individual [as above plus regional and territorial. Developers are a driver for new developments that influence the need for ICCM in Auckland and some other parts of NZ)
ICCM organisation example	Highest political decision-making, international agreements. International commissions [Regional Councils]	Province, State, District or Territory Inter-state basin commission/ authority/ association [Regional Councils]	Village cooperative, farm, factory, forest, individual. Local land and water management group [Territorial Authorities]
ICCM document examples	International agreement [National policy or Framework; an ICCM plan]	River basin management plan [ICCM plan or issue specific management plan e.g. stormwater management plan]	Land and water management plan. [As above, plus district and structure plans]

Internationally, ICCM is commonly adopted at a macro scale (ASCE, 1998; Davis, 2007; Global Water Partnership, 2000 and 2008; Holzwarth, 2002;; Hooper 2006; Kemper et al, 2007; NRM Ministerial Council, 2003; Menzies and Hooper, 2008; Palmer et al, 2007). This not unexpected, as a macro scale ICCM has benefits including:

- effective coverage of multiple biophysical, social and economic variables in order to achieve holistic planning processes;
- coverage across political/ jurisdictional boundaries in order to achieve integrated management outcomes; and
- avoiding uncoordinated management responses at smaller scales.

Another factor favouring the macro scale approach is the need to design and implement ICCM programmes that address the complex linkage between marine systems, coastal regions and their connected river basins. The UNEP has developed a framework for assessing progress of ecosystem based management that integrates catchment with coastal management, termed the Orders of Outcome Framework (UNEP/GPA, 2006). It can be applied at a range of spatial scales to analyse the results of ecosystem-based management initiatives in complex estuarine receiving environments.

The small number of papers that refer to meso and micro-scale planning refer do so more in recognition that certain elements of best practice can be incorporated at these scales than as a recommendation that this is best practice (ASCE, 1998; Bellamy et al, 1999; NRM Ministerial Council, 2003; Global Water Partnership, 2008). Furthermore, meso and micro-catchment and coastal scales can be more appropriate and practical for providing detail and specific activities that are relevant to local stakeholders and implementation programmes.

3.1.2 INSTITUTIONAL FRAMEWORKS AND GOVERNANCE

The key to achieving sustainable management through ICCM outcomes, and perhaps the most universal area of discussion amongst the international literature reviewed for this paper, is the need to develop robust institutional and governance frameworks to support ICCM development and implementation. ICCM requires a governance framework where the different and often competing interests that exist within the targeted geographic area find common ground and where multi-sectoral stakeholder issues are regulated and balanced (Global Water Partnership, 2003).

To facilitate a robust and workable governance framework, Kemper et al (2007) recommend decentralised institutional arrangements operating at a macro scale; in particular, the establishment of an authority (such as a River Basin management authority or commission – or regional council in the case of New Zealand) that is empowered to create and modify institutional arrangements within the geographic management area is most likely to allow the effective functioning of the ICCM process, as it can tailor management responses to the particular physical, social, and economic setting of each management area.

A key element cited by Kemper et al (2007) is the extent to which local communities can design and implement their own institutional arrangements via a collaborative approach. This collaboration with regard to institutional frameworks has the dual benefit of attracting increased stakeholder involvement from ICCM commencement; and through this participation, enabling the transfer of local knowledge back to the delegated management authority.

Contrasting with this decentralised approach, Hooper (2006) suggests that ICCM decision making, while being made via a similar, authority or commission manager as endorsed by Kemper et al (2007), is most successful when it occurs within an overarching, national natural resource management framework that includes defined objectives and investment strategies. In this approach, decision making is consensual and coordinated across the public and private sectors of the nominated management area. The Authority or Commission has a defined business plan that identifies ICCM priorities, focuses on efficiency, links vertically to governments and provides stakeholders with access to government (Hooper, 2006).

This form of national, cross-jurisdictional natural resource management framework has been established and operational in Australia for several years. Several national framework documents have been developed by the Australian Natural Resource Management Ministerial Council with the aim of providing coordinated, targeted management programmes and strategies for improving natural resource management including ICCM (NRM Ministerial Council, 2003).

Three of the national frameworks were reviewed:

1. National Framework for Natural Resource Management - Standards and targets (a);

2. National Framework for Natural Resource Management - Monitoring and evaluation (b); and
3. National Framework for Natural Resource Management - Capacity building (c).

The frameworks represent the broad operational policy objectives for all Australian natural resource management (NRM) programmes and are designed to operate across scales and to respond to integrated or specific NRM issues. All of the Frameworks establish targets and objectives to achieve NRM outcomes. Table 3 summarises the objectives of each Framework.

Table 3: Australian national NRM frameworks

Framework	Standards and targets	Monitoring and evaluation	Capacity building
Objective	Articulates the specific, measurable, achievable, realistic and time bound (SMARTER) principles for achieving on-ground NRM improvements	Sets out the requirements for assessing and measuring NRM goal completion with regard to specified standards and targets	Provides a comprehensive best practice approach to the implementation of capacity building for Governments, NRM Managers; Investors; the Community and private landholders/ stakeholders.

¹ SMARTER - specific, measurable, affordable, realistic, time bound, endorsed and relevant goals, objectives and targets.

The NRM Frameworks provide clear direction for all NRM programmes in Australia and articulate targets, standards, monitoring and reporting requirements over multiple timeframes and differing geographic scales and for diverse NRM issues. By providing this clear policy direction, the Australian Federal and State governments, as signatories to the Frameworks, collectively aim to improve the governance and institutional arrangements in order to deliver gains in on-ground resource condition and improve investment outcomes for NRM bodies.

The horizontal integration of NRM governance systems is identified by Bellamy et al (2002) as an issue for achieving robust ICCM outcomes. Establishing strong collaborative management and performance operational relationships that are formalised through regulatory or voluntary instruments (such as a Memorandum of Understanding) is essential to ensuring that the large number of public and private sector stakeholders within an ICCM area that have ICMP responsibilities achieve these responsibilities in a coordinated, strategic manner that avoids incremental, ad hoc programme delivery which may result in poorly coordinated and measured ICMP outcomes.

Bellamy et al (2002) highlight the significant shortcomings in many areas of ICCM planning and implementation due to a lack of coordinated organisational design. In many cases there are several agencies or bodies responsible for specific ICCM activities (e.g. water management, land use planning, vegetation management, catchment management) meaning that truly integrated catchment management can be difficult unless these responsibilities are rationalised or robust governance systems are established. Bellamy et al (2002) propose a "best practice framework" which recommends "fostering institutional arrangements that are enabling" including empowering collaborative governance and integration of governance systems; it is recommended that institutional arrangements must enable the achievement of ICCM outcomes. A significant part of the best-practice ICCM framework describes the

requirement for cross boundary participation and recognition of issues in order to achieve successful ICCM.

It is therefore evident that effective governance is one of the most significant challenges to achieving successful, long-term ICCM. Effective governance has been defined by the Global Water Partnership in their 2003 paper as being open and transparent; inclusive and communicative; coherent and integrative; equitable and ethical; accountable and efficient.

Davis (2007) outlines the benefits of robust institutional frameworks via the vertical integration of law, policy and agency responsibility for designing and implementing IWRM that are also applicable to ICCM. In California, USA, he describes how federal, state and local governments operate to achieve vertical integration; this is despite specific federal IWRM legislation. This occurs through the establishment of key policies or laws which establish frameworks for each progressive level of government to work within. In France, Davis (2007) documents that IWRM is undertaken by River Basin Commissions at a macro scale, but sub-basin plans can be prepared at a more local level provided they are consistent with the Basin Plan. Despite this, the national government retains veto powers for IWRM outcomes if necessary. Davis notes that in practice, horizontal integration may have been impaired due to government agencies and stakeholders resisting change and endeavouring to "protect their patch". Importantly there is acknowledgement that integration should also occur across technical disciplines so that collaborative approaches result from well integrated institutional arrangements.

Kay and Alder (2005) have noted a different situation with respect to coastal management. They note that coastal management involves many and varied stakeholders, often from a much wider geographic area than freshwater or terrestrial based catchments. These stakeholders include those charged with the legal responsibility for managing coastal areas, including different levels of government with land under their direct control and coastal industries which may be required by law to restrict pollution into coastal waters. Kay and Alder document that it is generally acknowledged that there is no commonly accepted best institutional arrangement for managing coastal resources. Coastal programmes must have an institutional identity (it is identifiable as either an independent organisation or a coordinated network of organisations linked together by functions and management strategies). Wherever possible, the institutional arrangements for new coastal management programmes must tailor administrative structures to take advantage of the particular cultural, social, political factors within their jurisdiction as they interact with the issues being addressed.

3.1.3 LEGISLATIVE FRAMEWORKS

Having identified the importance of institutional and governance frameworks to achieving successful ICCM, it would seem to be equally critical to establish a strong legislative framework within which the governance arrangements can operate. However the international experience is somewhat divided as to the necessity of a legislative framework, or at best, the requirement to undertake ICCM within the framework of a specific, tailored integrated catchment management legislative instrument.

For example, Davis (2007) demonstrates that IWRM can occur without a specific national legal mandate to facilitate implementation (e.g. in California, USA). However even when the IWRM process itself is not enabled by law, its implementation generally depends on the establishment of legal frameworks that outline responsibilities, requirements for IWRM and in some cases prescribe environmental and socio-economic priorities that must be considered throughout the planning and implementation phases of IWRM. In

Australia there has been a varied approach to the use of legal instruments to facilitate or mandate ICCM. Bellamy et al (2002) outlines the varying approaches to legislation for ICCM / NRM planning within Australia; including that some states have dedicated ICCM / NRM legislation while others rely on a policy framework. Both systems work, depending on the context. Conflicting with this outcome is however the fact that in some cases, where legislation exists, there is a disconnect between the organisations tasked with preparing ICCM plans and those implementing them, meaning that any legislative basis for planning is eroded due to the lack of integration between the agencies with different roles (Bellamy et al, 2002).

More commonly, ICCM is seen as requiring a strong legislative framework within which to operate (Holzwarth, 2002). For example, the European Union (EU) has a legislative framework for integrated planning for catchment-based river basin governance, the Water Framework Directive, which became law in 2000. This legislation is only a framework for supporting planning and will only work successfully if the policy context it operates within is agreed to by all planning participants (Holzwarth, 2002). In other words, to achieve successful ICCM planning, community and political ownership of the catchment management issues and the legislative mechanisms in place are essential for ICCM to operate effectively.

In the EU context where river basin boundaries may cross multiple political boundaries, it is critical that any ICCM legislation can be recognised and enforced across these jurisdictional boundaries, for example by way of a framework that is not solely dependent on a single jurisdictional legislative requirement. This is achieved through an inter basin agreement signed by the EU Commission and a Ministerial Council, as well as the requirement for nations within the EU to incorporate the provisions in the Water Framework Directive into national law (Hellberg, 2007; Holzwarth, 2002). This approach has been widely used with successful examples also occurring in Australia through the Murray-Darling Basin Agreement and in the Mekong River catchment with Thailand, Lao, Cambodia, Myanmar and Viet Nam participating cooperatively through the Mekong River Basin Commission (G Fishburn, pers. comm., July 2008). This approach ensures that policy and legislation between jurisdictions are agreed and compatible. The approach is worthy of consideration in all jurisdictions, including in the Auckland region where catchments cross TA and regional council boundaries.

3.1.4 COLLABORATION – PUBLIC AND PRIVATE SECTOR ROLES

Collaboration between and within the public and private sectors (including the general community, stakeholders and business) is critical to achieving successful ICCM, as it ensures that all participants are engaged in and “own” the ICCM process. Genuine collaboration between government and its agencies and all parts of the private sector is more likely to achieve greater long term benefit and outcomes when utilised from the start of the ICCM process. Most commonly, a bottom-up participative approach is advocated, although a hybrid model comprising some bottom-up and some top-down engagement is also suggested as being necessary in cases where the private sector either lacks the capacity to engage in the ICCM process (for example in poorer nations) or the social importance of an ICCM issue (e.g. access to high quality drinking water) often requires a greater degree of public sector ownership of the ICCM process. Furthermore, a key top-down contribution can be a facilitating role, which can include meeting and planning forums, technical expertise and funds (Davis, 2007).

It is clear that public and private sector roles and responsibilities should be clearly articulated at the start of the planning process (e.g. ABARE, 2003, Global Water Partnership, 2000; Hooper, 2006; Kay and Alder, 2005;). Moreover there should be a

high degree of trust between the participants in the ICCM process (Kemper et al, 2007). While trust may be difficult to achieve in the early stages of ICCM as different participants bring their various (and possibly conflicting) issues and requirements to the ICCM planning table, several authors highlight that there needs to be clear communication and a willingness to participate openly without pushing specific agendas (Kemper et al, 2007; Menzies and Hooper, 2008; Palmer et al, 2007). This goodwill is seen as imperative to achieving a collaborative ICCM

Using a stepped, engaged and interactive process with stakeholders that is based on trust and partnership building and supported by rigorous science is essential to achieving a collaborative ICCM process (Menzies and Hooper, 2008). Similarly Bellamy et al.'s (2002) best practice principles recommend achieving ICCM goals through participatory goal setting that incorporates all parts of the community and which is backed by a management framework that focuses on enabling implementation to achieve agreed outcomes.

There is an acknowledgement that historically, ICCM processes have been suboptimal where organisational and institutional frameworks have been unclear (Bellamy et al, 1999). Best results should occur when ICCM is completed at a local level through community based, but government supported regional bodies (boards, committees or similar). Bellamy et al (1999) note that ICCM is most successful where a committed, experienced and knowledgeable catchment coordinator or ICCM champion (or both), drives the process for the community, but within a clear and defined policy framework.

Kay and Alder (2005) note that in an integrated coastal management setting, the process of selecting management targets and implementation priorities is often heavily influenced by local languages and cultural settings. In these cases, consensual planning techniques are used to emphasise the importance of learning to these communities, provide empowerment, and effective communication to engage stakeholders in the planning process. Consensual planning is widely used across to develop management plans through building consensus between the various stakeholders taking part in the planning process (Kay and Alder, 2005). Several groups of issues are important in this collaborative approach to integrated coastal management and which also apply for ICCM more broadly (Kay and Alder, 2005):

1. integration among sectors: among coastal/marine sectors; between coastal/marine sectors; and with other land-based sectors such as agriculture;
2. integration between the land and the water sides of the coastal zone;
3. integration among the levels of government (national, sub national, local);
4. integration between nations; and
5. integration among disciplines, e.g. natural sciences, social sciences and engineering.

Urban water planning and management processes have tended to be "dominated by technocratic expertise and resulted in plans with a series of technologies with little consideration to the socio-political development strategies needed to enable political relevance and need within the community and the broader local administrative system" (Brown, 2005). It was evident from this Australian urban stormwater case study that the urban water management programme "involved a centralized authority directing local government to prepare plans in consultation with the community, which was unsuccessful, yet all of the plans achieved regulatory compliance. The legislative direction was based on a false technocratic assumption of how to enable change. It involved one set of centralised technical experts directing another set of local technical

experts to develop engineering plans. As it turned out this was indeed a naive approach for enabling change towards a more sustainable urban water future, with the idea that the identification of technologies will 'somehow' translate to the necessary political and social capital needed to advance institutional change and implementation" (ibid, p7).

Where possible the Global Water Partnership (2003) recommends a move away from insular, top-down organisational management and planning structures that fail to adopt a holistic approach to ICCM and towards structures that favour a gradual bottom-up approach. Bottom-up approaches are recommended, but there is a strong recognition that this is dependent on the maturity of the local circumstances. Similarly, Bellamy et al (2002) identifies an "emergent bottom-up" approach where there is strong recognition of stakeholder collaboration in ICCM as the heart of policy formulation for each catchment.

There is a strong emphasis on relationship-building, so that communities are aware of and responsive to "duty of care" responsibilities to the environment and other stakeholders and so that government agencies need to adopt flexible approaches to facilitate and enable effective engagement of various stakeholder groups including indigenous groups (Bellamy et al, 2002).

In any collaborative model of ICCM, it is important that collaborative participation by both the public and private sector is both ongoing and continuous and does not stop following the finalisation of an ICCM plan (Holzwarth, 2002).

3.1.5 CAPACITY BUILDING

An important extension of the collaborative approach to ICCM is the need to build participant capacity through various mechanisms. Davis (2007) notes that capacity building is recognised as an issue to be addressed on several levels; from the governance/ institutional level it is identified as a critical component of the horizontal and vertical integration of ICCM processes across private and public sector organisations (including technical capacity building); and in particular in less developed nations or amongst minority groups, capacity building is critical to ensuring that the full social, cultural and economic value of a catchment is captured in order to genuinely engage communities and stakeholders in a full participatory ICCM process.

Capacity building is particularly important for community-based ICCM participants, (Bellamy et al, 1999) and should be an ongoing process throughout the lifespan of the ICCM process as the planning and management needs and outcomes mature. Capacity building may occur either as direct, targeted extension or education programmes, or more organically through direct contact between experts and non-experts. A key approach in any capacity building programme is easy access to information. Governments can address enhance capacity building through the public provision of information through the sponsorship of research projects, communication strategies (including publicly available data sets) and education programmes (ABARE, 2003).

It is critical to understand that capacity building is a two-way process, whereby technical or policy experts pass knowledge to political leaders, industry, stakeholder participants, individuals and the broader community – and that knowledge is also transferred from these 'non-technical' participants back to the technical experts. Additionally, large gains need to be made in targeting capacity building with indigenous participants (NRM Ministerial Council, 2003).

An often overlooked component of capacity building is the need to incorporate succession planning (Bellamy et al, 1999). This is driven by the recognition of "burn out", particularly by community-based participants who are often heavily engaged in multiple participatory roles. Succession planning is equally important for public and private sector experts, especially where organisational restructuring and ageing workforces conspire to remove respected practitioners from ICCM practice. In both cases, the use of alternative or proxy participants in the capacity building process means that there is minimal loss of progress if critical participants step away from the ICCM process at any time (Bellamy et al, 1999).

3.1.6 INVESTMENT AND RESOURCING

It is widely recognised that ICCM is extraordinarily complex due to the integrated nature of the biophysical and human variables considered. ICCM often requires physical, infrastructure, environmental and behavioural change that may require large-scale readjustments in social, economic and environmental systems in order to achieve measurable on-ground outcomes.

This requires sustained financial investment through the allocation of financial and human resources in order to achieve long term ICCM programme outcomes (Bellamy et al, 1999; UNEP/GPA, 2006). As most ICCM processes and outcomes operate over long time scales, it is critical that financial support extends over the lifespan of the planning and implementation programme (Bellamy et al, 1999). Despite this, funding sources are often implemented over a five to seven year timeframe, whereas perceptible changes to resource condition often occur on much longer timeframes (for example 20-50 years or more). The success of ICCM is therefore susceptible to changes in funding arrangements and may be subject to political timeframes. Securing long-term commitment by government and community investors is therefore essential for ICCM to succeed (Bellamy et al, 1999).

Moreover, there is a risk that funding may be jeopardised unless funding bodies explicitly recognise that ICCM outcomes may occur over longer timeframes. It is critical that governments and other investment bodies recognise longer timeframes and allow for adequate funding to cover the cyclical and adaptive management ICCM process (and not just the initial planning): planning, implementation, monitoring, revisit planning to reflect monitoring and improved understanding and knowledge, further implementation, continued monitoring etc.

Suggested options to pursue investment in ICCM processes include:

- direct government funding;
- indirect government funding including works programmes for associated ICCM activities, the provision of physical resources (staff and equipment) and subsidies;
- user pays or similar market based mechanisms;
- private sector investment; and
- joint public and private sector partnerships or cost sharing.

The Global Water Partnership (2008) has identified three key funding streams for gaining access to and acquiring suitable funding to support the ICCM framework and to deliver measurable on-ground outcomes:

1. user or beneficiary payments, which can either be in cash or through donations of labour or materials. Payments from some users may be used to cross-subsidise others;
2. government budgets derived from taxation or the sale of state owned resources, goods and services, and which are protected from general government revenues; and
3. grants and aid from donor agencies, non-governmental organisations and charities.

In the USA, river basin management programmes are financed through cost-sharing arrangements between all levels of government and the private sector (Hooper, 2006). By pursuing this approach, adequate financing is on-going, guaranteed and linked to national and state ICCM priorities (Hooper, 2006). In pursuing government investment in ICCM, a macro-economic approach is critical as it will drive integrated policies across government agencies and policies and the community broader community (ABARE, 2003; Global Water Partnership, 2008). In most jurisdictions, multipurpose management agencies have several potential income sources and could be self-financing if they were properly structured and empowered, and also had sufficient financial autonomy.

Additionally, the use of market-based mechanisms (e.g. user/unit use fees for water supply and sanitation) to achieve full cost recovery for ICCM authorities and water services is considered as an important driver for attracting and retaining private investment in ICCM programmes (ABARE, 2003).

ABARE (2003) identify that economic instruments can influence the behaviour of resource users affected by ICCM processes to ensure that natural resources are used more efficiently. Appropriate instruments include price based mechanisms (e.g. taxes, charges, levies) or quantity based mechanisms (e.g. numerical constraints, quotas that create a market for trade). To most efficiently deploy these economic instruments generally requires the complementary use of property rights and a strong legislative framework. ABARE suggest that economic instruments to effect ICCM policy are advantageous as they allow each user to adapt their management response to their individual situation in order to achieve cost efficiencies.

However, it is critical that governments do not send ambiguous signals through lack of coordination across government programmes. An example of this occurred in Australia when some NRM agencies were advocating the growth of farm forestry via taxation incentives while conversely other agencies were encouraging water use efficiency through user pays market mechanisms. As a result there were confounding resource outcomes and market confusion as the growth in plantation forestry resulted in a net loss of stream flow through runoff interception by the plantations whereas part of the market was being encouraged to increase stream flow to provide water for the environment.

Any ICCM funding scheme should therefore consider all market sectors – such as forestry, housing and land planning or agriculture so as to reduce direct pressures on funding streams that are applied directly to the ICCM process (Global Water Partnership, 2008).

3.1.7 ADDRESSING BIOPHYSICAL, SOCIAL, CULTURAL AND ECONOMIC VARIABLES

The very intent of ICCM is to incorporate management actions that encompass and address a diverse multitude of biophysical, social, cultural and economic (multiple bottom

line) variables within the process. Not surprisingly, addressing the array of catchment and coastal variables requires grounding at a local level so that relevant issues are considered and issues that are irrelevant or unimportant for the local context are disregarded.

A multitude of variables may be critical for ICCM, with most of them common across most jurisdictional boundaries and geographies. Table 4 briefly summarises some of the key variables that should be considered and where appropriate addressed in the ICCM process. This is not suggested as a comprehensive list of every variable to be considered under ICCM, but demonstrates that the suite of variables that must be considered is broad and the web of relationships between these variables adds to the complexity and challenge of developing a truly holistic ICCMP.

Table 4: Multiple bottom line variables for consideration during ICCM

Biophysical	Social and cultural	Economic
<ul style="list-style-type: none"> ▪ sustainability ▪ climate change ▪ water quantity ▪ water quality ▪ flooding ▪ return flows ▪ hydrology and hydrogeology ▪ surface and groundwater connectivity ▪ freshwater - marine continuum ▪ estuarine and coastal environments ▪ coastal erosion ▪ estuary flushing ▪ rainfall ▪ runoff ▪ geomorphology ▪ vegetation communities especially endemic vegetation ▪ vegetation cover ▪ soil health, including erosion, salinity, sodicity and acidity ▪ soil types/ groups ▪ aquatic and terrestrial fauna ▪ threatened species and ecological communities ▪ dependent ecosystems such as wetlands 	<ul style="list-style-type: none"> ▪ sustainability ▪ climate change ▪ equity ▪ recreational values ▪ aesthetic values ▪ spiritual values ▪ cultural values, including those of indigenous communities ▪ health ▪ heritage assets ▪ property rights including those for water entitlements ▪ third party impacts ▪ flood risk and management ▪ behavioural attitudes and change ▪ educational standards (capacity) ▪ communication ▪ ethnic diversity ▪ political boundaries ▪ intergenerational equity ▪ legislative requirements ▪ political environment 	<ul style="list-style-type: none"> ▪ sustainability ▪ climate change ▪ equity ▪ property rights – changed asset value ▪ land use and planning ▪ resource allocation and availability ▪ asset management ▪ impacts to local economies ▪ market failures ▪ implementation costs to public and private sectors ▪ market based incentives for change (pricing, tax, levies) ▪ investment strategies ▪ resource asset markets and trading ▪ competition

These variables are well recognised as being of importance to ICCM, with many other authors providing extensive discussion of individual variables and the critical importance of the interaction between variables in defining and influencing ICCM processes and outcomes.

3.1.8 MONITORING, EVALUATION AND ADAPTIVE MANAGEMENT

When preparing an ICCMP and managing for its implementation, adaptive management responses are critical to ensuring that the ICCM outcomes are sufficiently flexible to address and manage altered, new or emerging natural and human resource responses. Evaluating the responses to management programmes, over varying timescales, is essential to ensuring that ICCM outcomes are achieved – in particular it’s essential that monitoring and evaluation take note of the short, medium and long term horizons over which substantive improvement to biophysical condition generally occur. Acknowledging the success and failure of ICCM processes is also critical once on-ground implementation commences, as it is through this evaluation process that adaptations to the management regime can be identified and rolled out in order to continuously improve the biophysical, social and economic (triple bottom line) results of the ICCM programme.

Menzies and Hooper (2008) describe management as being adaptive when relevant stakeholders in a catchment assess the efficacy of different ICCM options, test these in sub-catchments, learn from these experiences, then promote wider application. Assessing options with multi-criteria analysis techniques (Menzies and Hooper, 2008) helps to capture multiple bottom line dimensions of decision-making and monitoring. Robust adaptive management must incorporate regular monitoring, evaluation and reporting of ICCM outcomes. Monitoring, evaluation and reporting must occur under targeted implementation programmes and occur at regular intervals. It is important to recognise that any monitoring, evaluation and reporting programme incorporates change through both quantitative and qualitative data. Monitoring should also capture data that will assess changes to biophysical, social and economic variables.

In order to achieve adaptive management through monitoring, evaluation and reporting, an ICCM needs to first have clear goals, objectives and targets. The Australian NRM Ministerial Council’s (2003) National NRM Frameworks for monitoring and evaluation and standards and targets are suggested as strong examples for establishing ICCM key performance indicators (KPIs) and the subsequent programmes to monitor and evaluate these KPIs.

Figure 1: Australian NRM monitoring and evaluation frameworks

	Natural Resource Condition	Program, Strategy and Policy Performance
Monitoring	* Natural resource condition monitoring at local, regional, State/Territory and national levels	* Monitoring of resource condition against Standards and Targets Framework. *Management action monitoring.
Evaluation	* Evaluating progress towards improved natural resource condition at the national level	* Performance evaluation of programs and strategies.

Evaluating models & assumptions

Holzwarth’s (2002) analysis of the Water Framework Directive outlines that the EU approach permits flexibility and adaptation to develop locally specific solutions to ICCM issues, or put simply, there is "no best way" to undertake ICCM. Holzwarth discusses that successful ICCMs require "limit values" and "environmental quality standards". Best

practice approaches to ICCM should permit flexibility and adaptive management to develop solutions that are tailored for local circumstances.

A continuous feedback loop, between the assessment of natural resource health and institutional performance in implementing management outcomes is also critical to effective adaptive management (Davis, 2007). ICCM by its very nature is a responsive decision-making process, as successful ICCM development engages communities and decision makers to address resource sharing issues with the goal of improving or redressing competing demands for resource use through continuous monitoring, evaluation and adaptation of the ICCM programme.

Additionally, there is an immense challenge for ICCM practitioners to demonstrate the extent to which environmental conditions change as a result of actions (Hooper, 2006), especially in a climate of evidence based investment funding demanded by many central and regional governments. It is clear that in order to successfully implement an ICCM programme, then a robust, targeted and well resourced monitoring and reporting programme is essential. This monitoring and reporting framework must evaluate ICCM outcomes and feed back into an ICCM adaptive management framework. Embracing this adaptive management approach is critical to demonstrating and 'future proofing' any ICCM programme and ensuring that resource improvement occurs on both a short term and long term time scale.

3.1.9 SUMMARY

Core elements of success that emerge are:

- appropriate management scales/boundaries;
- political leadership;
- collaboration between and within the public and private sectors;
- genuine community participation through bottom-up collaboration;
- local ICCM champions, together with good resourcing and succession planning;
- capacity building;
- adequate resourcing and investment over the long term;
- strong governance and clear institutional roles and responsibilities;
- specific, measurable and time bound targets to focus ICCM programmes; and
- adaptive management that is driven by monitoring and evaluation outcomes.

4 TOWARDS ICCM: LEARNINGS AND APPLICATIONS FOR THE AUCKLAND REGION

Like other parts of the world, the Auckland region is defining and applying sustainability principles to complex real world management issues and has made a significant investment in catchment and coastal planning, while outcomes are as yet elusive. This vision has been defined in terms of outcomes across all four wellbeings and it is no small matter to implement plans that are able to bring them into effect. It is timely indeed that learnings from local and international experience are brought to bear upon catchment and coastal planning as players in the region now work together on plan implementation.

While ICCM concepts have been used internationally for over a hundred years, examples of successful long term ICCM programmes remain infrequent. This is an intriguing finding, because ICCM is widely supported as the 'best practice' approach to achieving holistic natural resource management that is sympathetic to socio-economic considerations.

The ensuing discussion suggests key elements of successful "best practice" ICCM that can be useful for the Auckland region derived from the preceding international literature review.

4.1 SCALE

Scale is a major consideration for ICCM, environmental data collection, management and monitoring. In particular, the Global Programme of Action (GPA) for the Protection of the Marine Environment from Land-based activities, co-ordinated by UNEP (UNEP/GPA, 2006), recognises changes in ecosystems that have transboundary consequences and need management programmes that address the complex linkages between marine systems, coastal regions and river basins, especially estuaries.

Estuaries and harbours are the defining geographic feature of the Auckland Region. From an ecosystem point of view, estuaries and harbours can be considered a natural management unit for integrating the management of catchments with that of their ultimate coastal receiving environments. It is suggested that regional, macro, meso and micro approaches to ICCM be considered for the Auckland region due to the region's issues and the presence of a comparatively small number of large harbours with estuarine receiving environments. These scale definitions combine those identified by Hooper (2006) with existing planning processes within the Auckland region, as well as reflect the physical geography within the region. The nested terminology below can be used as a basis for further discussion on planning scales and terminology.

1. Regional strategic cross catchment approaches reflect existing regional management and collaborative approaches, such as the Regional Growth Forum and the Auckland Sustainability Framework (Regional Growth Forum, 2007).
2. Macro – primary catchment: defined on the basis of shared saline receiving environments, the main harbour catchments would comprise the Kaipara, Manukau, Waitemata Harbours, and other residual areas of the east and west coasts with similar biophysical and human settlement characteristics. Into these, many local catchments discharge sediments and contaminants of concerns in these primary catchments. A key driver for managing at this scale would be ecosystem health in the saline receiving environments. There may not necessarily need to be a detailed ICCMP for the primary catchment as a whole, though enough detail would be needed to prioritise the issues affecting lands, freshwater and the saline receiving environment. These priorities would then guide setting research and management priorities in more detailed plans in the local scale catchments. A primary catchment management plan could also set out processes for joint management of catchments with waterways shared between different territorial agencies.
3. Meso - local catchment: defined on the basis of watersheds within the primary catchments, such as the Henderson Creek (i.e., Twin Streams) that discharges to the Waitemata Harbour; and the Mahurangi and Whangateau catchments on the East Coast. In addition to reflecting local impacts on the estuarine environment that support issues and objectives in the macro (primary catchment) level

planning, the local catchment plans could consider local issues of importance, such as flood management, water allocation and the ecological health (instream and riparian) of the streams that enter primary catchment receiving environments. This is in keeping with the definition of an ICMP in the Proposed Auckland Regional Plan: Air, Land and Water (PARP:ALW, ARC, 2007). When considering wider objectives of ICCM, local catchment plans could incorporate community identified objectives that may lie outside of statutory requirements (e.g., socio-economic issues that are addressed within Project Twin Streams in Waitakere City Council).

4. Micro - subcatchment: within each local catchment may from time to time be desirable to focus on certain sub-catchments for particular management reasons such as land use intensification or stormwater quality discharge to protect, for example, freshwater and marine receiving environments. This level of catchment planning would accompany the detailed land use structure planning process and reflect consistency with both the primary catchment and local catchment levels of planning.
5. Site: some areas in one or more sub-catchments may need to be targeted for particular reasons such as large subdivisions. These could be dealt with at the district plan change/structure planning and/or resource consent level to facilitate appropriate development within the context of the wider catchment plan.

A macro approach can be inclusive of meso, micro and site scale planning and implementation, thereby best incorporating the principle of vertical integration into the catchment and coastal planning frameworks. In addition to the strategic regional planning, other spatial frameworks exist that either do not conform to catchment definitions or simply differ in spatial extent to catchment delineations. ICCM must consider these differences and corresponding issues.

Other spatial frameworks include:

6. Groundwater catchments: many aquifers cross surface water divides, and in cases such as the Kaawa formation, the recharge area is quite small and needs protection.
7. Ecological districts that can entirely lie within catchments or cross catchment boundaries.
8. Regional infrastructure that traverse catchment boundaries, such as transport, water supply and wastewater networks.

Implementing the framework of spatial scales listed above may enable all stakeholders – elected representatives at national, regional and territorial levels; local communities and region-wide communities of interest; planners, engineers and other environmental and asset management professionals in the public, private and not-for-profit sectors to play active roles that are coordinated in line with the vision of the Auckland Sustainability Framework (Regional Growth Forum, 2007).

4.2 LEGISLATIVE AND ORGANISATIONAL FRAMEWORKS AND THE INCORPORATION OF REGIONAL PLANNING ISSUES INTO CATCHMENT PLANNING

Experiences from overseas have made it clear that having workable institutional and governance arrangements before starting an ICCM process is one of the most critical

elements of success. In the Auckland context, although the institutional and legislative arrangements are now present, they have both changed at critical times, for example just after the completion of the Manukau Harbour Action Plan in 1990 (Auckland Regional Water Board, 1990), local government was reformed and the Resource Management Act (RMA) was passed. The requirements of the RMA to prepare a regional coastal plan separately from other regional plans were perceived by some to make it more difficult to integrate land use, water use and coastal planning. Moreover the local government reforms that preceded the passage of the RMA seem to have interrupted a nascent ICCM process that, despite the supporting and enabling provisions of the Regional Policy Statement and Regional Coastal Policy, has largely resumed only in recent times – in the Auckland Case, since the appearance of the more prescriptive requirements of the PARP:ALW (ARC, 2007). This is in line with wider experience throughout New Zealand (e.g. Eyles, 2008).

The primary vehicles for achieving the desired level of integration of coastal and catchment planning are the Regional Policy Statement, Regional Plan: Coastal and PARP:ALW. The Regional Policy Statement is under review.

It is clear that numerous relevant national and regional planning documents address ICCM, many with specific reference to ICCM and related planning approaches, and all in ways that require or enable ICCMs to integrate the effects of land use on coastal waters by managing urban stormwater quality and stream erosion. However, there is further potential for catchment planning to better incorporate regional planning policy into catchment planning for coastal outcomes.

More recently, the agreements reached in the Regional Growth Forum and Auckland Sustainability Framework mean that ICCM has become an indispensable tool for planning land use and asset development in order to accommodate growth. The long timeframe of the Auckland Sustainability Framework – endorsing a 100-year planning horizon – can inform the setting of visions, goals and interim targets to measure progress.

An approach to coastal and catchment planning which integrates the relevant documents, strategies, people and processes within the ARC and with the TAs, Tangata Whenua and other interested government and non-government agencies may present an ideal opportunity for one of the early action plans proposed by the Auckland Sustainability Framework.

However, the Royal Commission's findings and outcomes on Auckland's Governance, may affect the organisational framework in ways that are not known at the time of writing.

4.3 FINANCIAL STRUCTURES AND RESOURCING

The funding of coastal and catchment planning in the Auckland region from the Auckland Regional Council, Auckland Regional Holdings and TAs demonstrates concentrated effort to these approaches in recent years.

Future funding for ICCM therefore needs to be considered. Internationally, cost-sharing is a strongly supported approach to achieving sustainable, on-going implementation of ICCM, where funding by both government and stakeholders (private and public) as it improves ownership and commitment. In a cost-sharing approach, financing is on-going, guaranteed, adequate, and linked to national, state and regional ICCM priorities.

The Global Water Partnership (2008) recommends that all market sectors be considered as funding contributors – including forestry, housing and land planning or agriculture, so as to reduce direct pressures on funding streams that are applied directly to the ICCM process. Growing interest in ICCM in New Zealand from sectors as diverse as farming and business show that such support may be available. More widespread public endorsement of ICCM may also help councils that have identified lack of capacity to do justice to their land use, catchment and asset management obtain the political and financial support they need.

4.4 PROGRESSIVE INTEGRATION OF WIDER BIOPHYSICAL, ECONOMIC, SOCIAL AND CULTURAL ISSUES INTO ICCM

A common thread of overseas ICCM is the lack of full “integration” of ICCM issues in the planning and implementation process. Many of the terms used to describe the ICCM process are themselves indicative of a lack of integration (e.g. Integrated River Basin Management Planning; Catchment Action Plans; Water Sharing Plans; Integrated Water Resources Management; Integrated River Basin Management). These suggest that aspects critical to integration, such as coastal and marine waters, groundwater, catchment land use planning and the full breadth of socio-economic considerations are not always incorporated into the ICCM process. A prevalent lack of integration is development of catchment plans largely independent from coastal plans, although in several instances many aims of catchments plans, in fact, address estuarine and coastal issues. Deeper analysis of the literature shows that, generally, most of these issues are at least considered in the early planning/ scoping phases, but often not carried forward into on-ground implementation. Yet again the question of “why does this occur?” must be asked.

While these various forms of ICCM no doubt set out to integrate various aspects of coastal and catchment management planning, there seems to be a disconnect between intent and outcome. The international experience does show that many ICCM variables are integrated into planning and implementation but the results also indicate that nowhere have all of the variables been combined to attain a truly holistic, integrated ICCM. In summary, it is clear that in conceptual terms, the integration of catchment with coastal planning in the Auckland region is in many regards on par with international practice.

In the Auckland region, there are strong links between catchment and RMA land use planning tools, such as district and structure plans, as well as asset management plans and other tools under the LGA. Both the RMA and LGA require consideration of resource management and sustainable development in integrated terms – that is, across multiple bottom lines, and this is reinforced by the requirements of the PARP:ALW to address the social, ecological, economic, amenity and cultural objectives. This would help to promote ecologically sustainable development espoused in overseas jurisdictions.

4.5 PROGRESSIVE PHASING IN OF RELATED ISSUES

The international review revealed that ICCM has evolved over its history to include a greater coverage of natural resource, environmental, social and economic variables. This reflects the change from a largely rural, water quantity or water quality driven ICCM process, to one that is more truly integrated and which addresses emerging issues such as ecologically sustainable development, socio-economic impacts, the need to manage for whole-of-environment outcomes and, more recently, to consider the looming potential of climate change impacts.

This widening circle of issues is being driven not simply through a realisation that a holistic approach is beneficial in delivering positive on-ground outcomes, but by the inclusiveness of contemporary ICCM following the wider adoption of a bottom-up approach and the input of community and stakeholder issues for ICCM.

The New Zealand history shows a progressive move towards inclusion of more issues into catchment and coastal planning, usually reflecting the interests of a widening circle of stakeholders as much as it does the broadening and deepening awareness of researchers and managers. The inclusion of Māori views and biodiversity are perhaps the best examples in New Zealand, along with the increasing interest in other infrastructure such as transport (as evidenced by the Local Government (Auckland) Amendment Act 2004 (the LGAAA), which directs all councils in the Auckland region to integrate their land transport and land use provisions and ensure these are consistent with the Auckland Regional Growth Strategy, give effect to its growth concept and contribute to the land transport and land use matters specified in Schedule 5 (s39 and s40 LGAAA).

The adoption by the Auckland region's TAs of best practice plan preparation (Ericksen et al, 2003) and multi-criteria analysis of management options (Feeney et al, 2007) together provide timely support for TAs and the ARC as they set up frameworks to define issues, objectives, methods and outcomes in integrated terms. The current focus is on urban wastewater and stormwater networks and their effects on receiving environments, but the requirement to meet the multiple bottom line objectives of the RMA and LGA will over time encourage catchment managers to widen the focus of catchment planning and ICCMs as an invaluable information repository and planning support tool.

This gradual inclusion of more and more items to be addressed in an integrated manner appears to work best in this way, as an organic "bottom up" move rather than being imposed by way of a top-down statutory requirement – as noted in Brown (2005), such edicts almost inevitably result in technical compliance with the new requirement in ways that do not lend themselves to feasible implementation:

"You cannot simply require integration any more so than you can sustainable management. It is a frame of mind that needs to be nurtured, developed, accepted, not only by technical experts and professionals, but also by the wider coastal community. It is clearly time to take advantage of the lessons of the past, the scope which RMA gives us to achieve integrated management, and the time we have now to make a difference to the way in which we manage much of our coast." (Brookes, no date).

Some key aspects that could be included in discussions about future planning for the Auckland region in the short to medium may therefore include:

- integration of rural and urban planning within catchments;
- aligning asset management plans with catchment planning in a more proactive way for greening brownfields developments: so planning the long term replacement of assets on a regional basis could align with opportunities to increase built asset capacity or, where desirable, progressively supplement and replace it with decentralised built and natural services to reintegrate water and plants into the urban water management system;
- progressively aligning ICCM more closely with other strategies, starting perhaps with biodiversity, pest and open space strategies, possibly piloted in a particular problem-shed with iwi to seamlessly include Māori outcomes in these areas;

- noting where communities are progressively phasing in additional matters of interest to them; and
- aligning such actions so as to demonstrate and document how integrated coastal and catchment planning may contribute to the achievement of all the goals of the Auckland Sustainability Framework.

4.6 PLANNING AND IMPLEMENTATION

Overseas and New Zealand research show that there is often a gap between an ICCM vision and its implementation, either because not enough time had elapsed for much to be done or because the studies were conceptual rather than specific place-based time-bound actions.

Day et al (2005) analysed the stormwater and other aspects of six district plans and found that:

- there is a gap between the intentions of plans as illustrated in policies and the actions taken in resource consents;
- commitment and capacity of councils were important contributors to the quality of plan implementation; and
- factors that will promote good implementation include increasing staff time, resources and guidance in preparing and implementing plans that have clear policies to give good direction for rules and other management processes; internal consistency in plans between policies, methods and rules and integration between policy and consenting staff.

How well a plan has been implemented remains unknown until the results of monitoring and review are available.

4.7 MONITORING, EVALUATION AND ADAPTIVE MANAGEMENT

The international literature highlights that adaptive management is a key to the success of ICCM programmes. Management plans and their implementation need to incorporate sufficient flexibility to adapt to new information, new scientific findings, changing legal, political, environmental and social landscapes and evolving resource and funding arrangements.

A pivotal element of successful planning and adaptive management is cost-effective and meaningful monitoring, to enable documentation of both plan implementation and plan outcomes. Key questions that monitoring needs to answer are:

- did we do what we said we would? In other words, how well are we implementing our plans (outputs)?
- did it make a difference – are the outcomes as anticipated?
- what else is going on – what other trends are present or emerging?
- does it make sense? – how accurate were our assumptions about cause and effect in selecting our methods in our plan? How well do we understand the environmental, social, cultural and economic systems and processes that we are attempting to influence?

The UNEP/GPA (2006) orders of outcomes framework helps catchment and coastal managers put in place monitoring programmes that will help them do this. However,

regional players in the wider sense also need to have input to an integrated monitoring programme that will:

- enable more integrated assessment of the four wellbeings across both the RMA and LGA Acts;
- meet the environmental and programme monitoring requirements of the RMA;
- enable cost-effective community outcome monitoring under the LGA that is integrated with RMA monitoring;
- inform the development and monitoring of resource consent conditions, to ensure they are aligned with policies and outcomes in the relevant laws, plans and strategies;
- link and co-ordinate the information collected under both the RMA and LGA by both the ARC and the territorial council/s; and
- pull information collected by iwi and community groups into a joint monitoring framework.

Comparison with the findings of the international literature shows that Auckland is at least on par with most international experience in the development of its planning frameworks for ICCM. However, like most other jurisdictions, implementation remains the challenge, with significant successes in the past (such as the Manukau Harbour Action Plan), and the current generation of ICMPs just embarking on an implementation phase.

The fact that consideration of stormwater, wastewater, water quantity and the freshwater –marine continuum are being considered as part of a holistic management approach through ICCM is placing the Auckland region on track with international ICCM developments.

Given that the scope of ICCMs will progressively grow over time as understanding of sustainability grows, it will be increasingly important for catchment and coastal managers and their interdisciplinary teams to:

- keep up with the wider sustainability dialogue; and
- further the practical application of natural principles to the design, development, maintenance and replacement of urban infrastructure in order to reduce the effects of cities on essential elements of the life-supporting capacity of their natural environment.

4.8 COLLABORATIVE MODELS

Successful ICCM needs integration:

- between disciplines, e.g. natural sciences, social sciences and engineering;
- among government departments and different stakeholders;
- between government and non-government stakeholders;
- across mean high water springs; and
- at the different levels of government that may affect ICCM outcomes.

Examples in the Auckland region of collaborative efforts that address these kinds of integration include:

- the Auckland Sustainability Framework (ASF), amongst institutional players (regional level planning; ARC-led regional effort);
- Integrated Kaipara Harbour Management Group (IKHMG) (macro-level – primary catchment planning; iwi-led multi-organisational effort).
- urban integrated catchment management plans (meso-level - local catchment planning; TA-led with technical and funding assistance from the ARC); and
- the Mahurangi Action Plan (MAP) (meso-level – local catchment planning; ARC led in partnership with Rodney District Council and the local community);

Allen et al. (2002) analysed the factors that contribute to successful partnerships between environmental management agencies and community groups in New Zealand. Their research suggested that joint partnerships have the greatest capacity for long-term sustainability, finding that partnerships that share resources and decision-making power lead to the most effective long-term commitment to changing environmental management outcomes.

This is highly congruent with the multiple bottom line approach to ICCM, where social and cultural outcomes are valued – and in fact become a key part of the vehicle for delivering the desired environmental outcomes.

The different scales proposed for ICCM lend themselves ideally to identification of stakeholders who may be appropriately engaged at each scale by way of the appropriate collaborative models – formal, informal and so on.

Many examples of collaboration discuss community-based stream bank planting and similar initiatives. However, while sectors like farming and business are often heavily regulated, regulation can also be accompanied by dialogue and partnership. The collaborative models would vary depending both on scale and also on the needs and capacity of the different stakeholders, ranging from formal memoranda of understanding to very informal liaison (Craig and Courtney 2004; Courtney, 2005).

However, for true collaboration and partnership, the capacity of all parties to genuinely engage will need to be built.

4.9 CAPACITY BUILDING

Globally and locally, the catchment and coastal specialty professions are under-resourced, and ARC has identified this as an issue for integrated catchment management planning since the inception of the Stormwater Action Plan (ARC, 2005). The need for and benefits of improved capacity building through more informed and educated decision-makers and members of the public was also documented in all the reports prepared for the Infrastructure Stocktake (Chapman et al, 2003). Capacity building for the community and professionals is also identified by the Global Water Partnership (2000) as a critical area that requires further effort.

In New Zealand the engagement of Māori cultural beliefs through the development of the Cultural Heritage Index (CHI) is an excellent example of capacity building in a bottom-up framework, where the CHI informs the resource management process to deliver better outcomes and build capacity for non-indigenous stakeholders (Ministry for the Environment, 2006). Within the Auckland region, there are significant opportunities to engage the public and in particular Māori to undertake monitoring and evaluation during the implementation and adaptive management phases.

ICCM is not only multi- and trans-disciplinary, it is multi-stakeholder, too. The Australian experience shows that the community engagement capacity of engineers and other urban water managers also needs to be built if cities are to achieve widespread and self-sustaining implementation of sustainable urban water management (Brown, 2005).

For better ICCM in the Auckland region, therefore, possible solutions include:

- fostering partnerships with councils, iwi, communities and sector interests;
- growing future capacity by fostering the entry of more students into the relevant professions, e.g. by working with schools, tertiary institutions and professional associations to attract more people into the sector and the wider sustainability industry;
- growing current capacity by widening the pool of people actively involved in the preparation, implementation and monitoring of ICCM plans, for example beyond engineering and planning to the biological and social sciences;
- growing current capacity of those engaged in the core disciplines to engage with related professions, elected representatives and sector and community groups; and
- growing the capacity of iwi, sector and community groups to play a more substantial and sustained role in ICCM.

4.10 LEARNING AND REVIEW

A key impediment to the preparation, implementation and monitoring of good plans is lack of time and resources (Day et al, 2005; Ericksen et al, 2003). While growing the capacity of councils, iwi and sector and community groups will eventually help with this, it is also important for good ICCM for all players (nationally, regionally and locally) to schedule regular periods of reflection, in order that people may become conscious of their needs, successes and learnings. Forums that could promote this already exist, such as the informal Auckland Regional Stormwater Liaison Group, regular seminars and annual conferences, but reflection time needs to be provided to enable this reflection to go deeper and wider into the professional, political and partnership participants and processes.

Developing a sustained awareness of the big picture to all players in the Region are committed will build and maintain the ongoing partnerships needed to achieve it.

5 CONCLUSIONS

A recurring theme in the international literature is that truly successful ICCM and planning remains elusive. Many of the authors, notably Davis (2007), discuss that ICMP has a long history of endeavour, without a correspondingly long list of successful examples of implementation and longevity. Perhaps related to this finding is that the "planning" phase of ICCM is often well resourced and completed to a high standard. However on-ground implementation is often less developed and financially supported meaning that genuine long-term benefits are not often observed, or at best, are too difficult to define as being the result of the ICCM process.

The question of "why does this occur" must be asked. Is there a fundamental failure in the process and if so, where is the weak link? Clearly investment is necessary to ensure on-ground outcomes are achieved and that ICCM is not just an exercise in recording

aspirational goals and targets but one that achieves substantive improvements in the natural and human environments.

In keeping with the international findings, areas where the Auckland region's performance can be improved relate to practice rather than vision: much of the literature observes that examples of implementation are rare, and when found, often only apply to a subset of the best practice criteria assessed in this paper.

This may perhaps be at least partly explained by one of the recurring themes of the New Zealand and Auckland histories; that of successive waves of proliferating bodies and tools followed by reform and amalgamation. This New Zealand experience is strongly supported by evidence from overseas where the continual reorganisation of ICCM bodies, changes to policy and legislation and reprioritization of investment funding makes it harder to gain long term, on the ground results in ICCM. Unfortunately most ICCM practitioners have little control over this process, but must nevertheless make the best of the institutional, governance, legislative and funding arrangements available to them in order to persevere with the goal of achieving successful ICCM.

Typical of these challenges, the Auckland region may be undergoing an institutional reform based on the findings of the Royal Commission on Auckland's Governance. People and their ongoing communication and collaboration are therefore the focus for change, if the findings of this paper are to retain relevance and get some traction in the short to medium term.

The research findings therefore suggested two related aspirational goals for the Auckland region :

1. building industry capacity and collegiality; and
2. building community capacity.

It can be argued that a collective focus on these goals will enable the full spectrum of coastal and catchment management stakeholders to transcend physical, administrative and other boundaries and other legislative and administrative changes and work within and between organisations, plans and processes in order to achieve truly integrated catchment and coastal management.

ACKNOWLEDGEMENTS

This study was funded by the Auckland Regional Council through the Stormwater Action Plan. Viewpoints expressed in this paper are those of the authors and do not reflect policy or otherwise of the Auckland Regional Council.

The authors would like to acknowledge the contributions of Andrew Tipene and Joanne Costello in reviewing and commenting on international ICCM practice and providing substantive input to the preparation of the report commissioned by Auckland Regional Council, *Tane and Tangaroa, Integrating catchment and coastal management – a survey of international and local best practice*.

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